

Ambient Processing for In-Situ Selective Reinforcement of Near Net Shape Structures (ISSR)

Completed Technology Project (2017 - 2018)



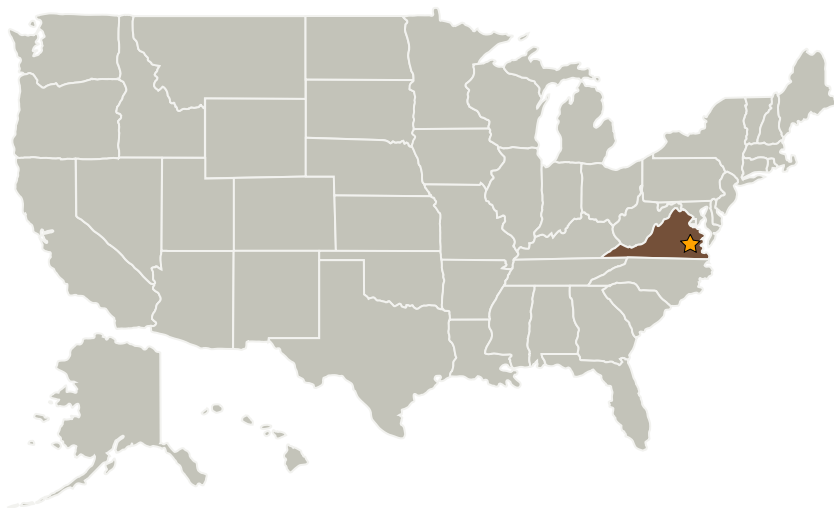
Project Introduction

Use AMPB's laboratory-scale rolling mill to simulate the dynamic conditions associated with metallic structure forming and fabrication methods. Use aerospace aluminum alloys and commercially-available aluminum metal matrix composite (MMC) for reinforcement. Assess aluminum flow behavior and the strain fields within the MMC and their effects on the reinforcing fibers. Flow aluminum plate material into grooved die with preplaced MMC to form and reinforce stiffeners at selected processing temperatures. Evaluate bond microstructures and mechanical properties.

Anticipated Benefits

The aeronautics mission directorate is interested in this work and has provided funding for technology maturation.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia



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Primary U.S. Work Locations

Virginia

Project Transitions



October 2017: Project Start



September 2018: Closed out

Closeout Summary: In-situ selective reinforcement using an industrial process was assessed under a small purchase order placed with Scot Forge. As a feasibility demonstration, the company used a 3000-ton forge press to forge an aluminum plate with several strips of MMC placed on the plate surface. The plate and MMC were preheated to their standard forging temperature and then subjected to the forging process. The MMC was successfully embedded into the plate and metallurgically bonded to the aluminum alloy plate. The successful test was the first time that the in-situ selective reinforcement concept was demonstrated in a full-scale industrial process in an industrial environment.

Project Website:

https://www.nasa.gov/directorates/spacetech/innovation_fund/index.html#.VQ

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Center Innovation Fund: LaRC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Julie A Williams-byrd

Principal Investigator:

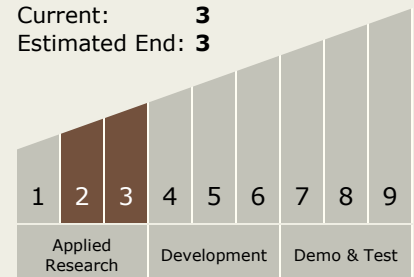
R Keith Bird

Technology Maturity (TRL)

Start: 2

Current: 3

Estimated End: 3



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.8 Smart Materials

Target Destination

Earth